Idaho National Engineering and Environmental Laboratory

Idaho HLW Overview

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EMSP HLW Workshop

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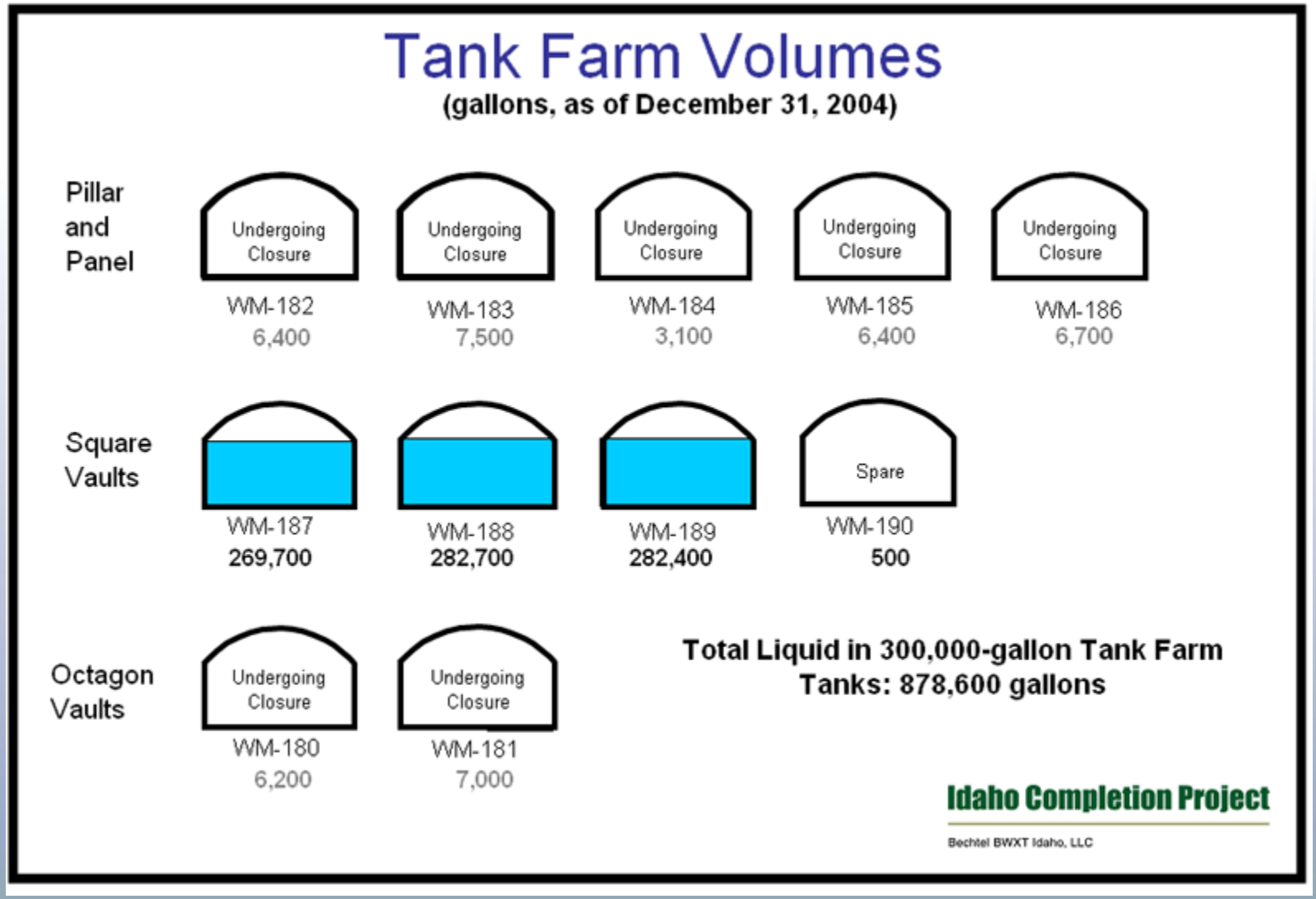
High-Level Wastes at the Idaho Site

- ***Liquid Sodium-Bearing Waste***
  - *Approx. 3.3 million liters of acidic liquid*
  - *Currently stored in 3 stainless steel 1.2 million liter underground storage tanks*
  - *Originated from processing DOE-owned fuel*
    - *Evaporator bottoms*
    - *Solvent wash*

Tank Farm Volumes

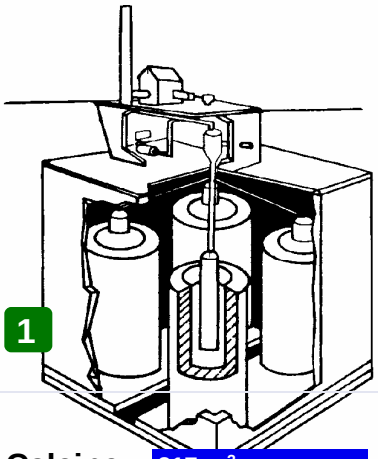
(gallons, as of December 31, 2004)

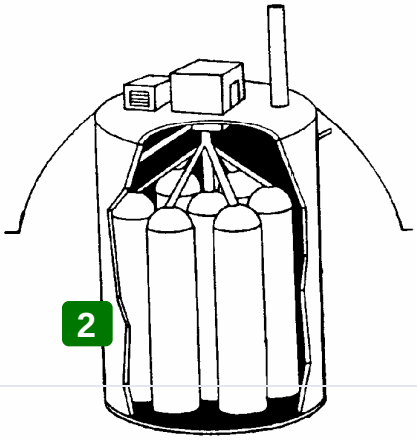


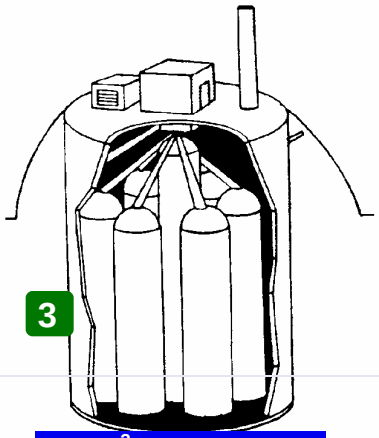
High-Level Wastes at the Idaho Site

- **Solid Calcine**
  - *Approx. 4.4 m^3 of solid calcine*
    - *~20 % from aluminum-clad fuels*
    - *~75 % from zircalloy-clad fuels*
  - *Stored in 6 stainless-steel bin sets enclosed in concrete vaults*
  - *Solidified first-cycle raffinate from processing Naval fuels (total element dissolution)*
  - *Calcine is stable waste form, but Cs, Sr are highly leachable*

Calcine Solids Storage Facilities

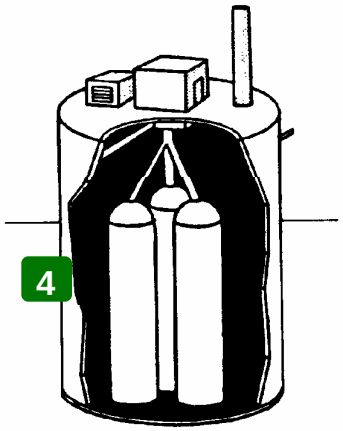


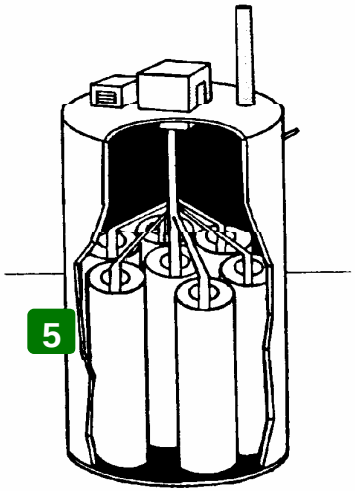


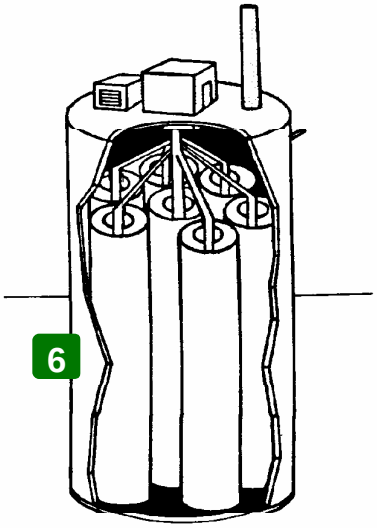


	1	2	3
Calcine:	217 m^3	856 m^3	1,092 m^3
Capacity:	227 m^3	856 m^3	1,097 m^3

Total:
4386 m^3
Calcine Waste
(as of 5/1/00)







	4	5	6	7
Calcine:	488 m^3	992 m^3	741m^3 (49%)	0m^3 (00%)
Capacity:	488 m^3	992 m^3	1,507 m^3	1,784 m^3

Issues related to Idaho Wastes

- ***Sodium-Bearing Waste***
  - *Tanks have never leaked, but are nearing design life (valve boxes, piping have leaked)*
  - *RCRA NoN for corrosive liquid- no secondary containment*
  - *1995 Settlement agreement mandates waste be "road ready" to leave Idaho by 2012*
  - *Recent WIR lawsuit*
- ***Calcine***
  - *Bin sets are designed for 500 yr operation lifetime*
  - *Characterization of calcine difficult due to numerous stratified layers in bins*

Treatment Technologies Evaluated

- ***Sodium-Bearing Waste***
  - *Numerous separation and direct immobilization technologies evaluated over past decade*
  - *Downselect to 5 technologies made*
    - *Calcination*
    - *Steam Reforming*
    - *Direct Evaporation*
    - *Direct Vitrification*
    - *Cesium removal by ion exchange/ grouting*
  - *First 4 technologies produce RH waste to WIPP*
  - *CsIX/grout option produces CH waste to WIPP*

Treatment Technologies Evaluated

- ***Calcine***
  - *Numerous separation and direct immobilization technologies evaluated over past decade*
  - *Current path forward is direct packaging in high-integrity canisters and disposal at Yucca mountain*
    - *No sampling or characterization*
    - *Use historical model to determine approximate waste composition*
    - *Calcine without canister is still below level of concern based on repository modeling*
    - *RCRA and Listed Waste as well as reference borosilicate glass standard for HLW are issues*

Technologies Evaluated

- *Separation technologies*
  - *Solvent extraction (TRUEX, SREX, UNEX)*
  - *Cs Ion Exchange (AMP, CST, $Fe(CN)_6$)*
  - *Filtration*
- *Direct Immobilization*
  - *Calcination (SBW only)*
  - *Vitrification*
  - *Steam reforming (SBW only)*
  - *Evaporation/Crystallization (SBW only)*
  - *Ceramic (Calcine only)*

Current Activities

- ***Sodium-Bearing Waste***
  - *No project, R&D or evaluation efforts are in progress, pending selection of Idaho Completion Project (ICP)contractor*
    - *ICP contractor not limited to down-selected technologies in RFP*
- ***Calcine***
  - *Limited project efforts on going*
  - *DIAL evaluating alternative thermal treatment and cementatious waste forms*

INEEL Site contacts

- ***ICP***
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